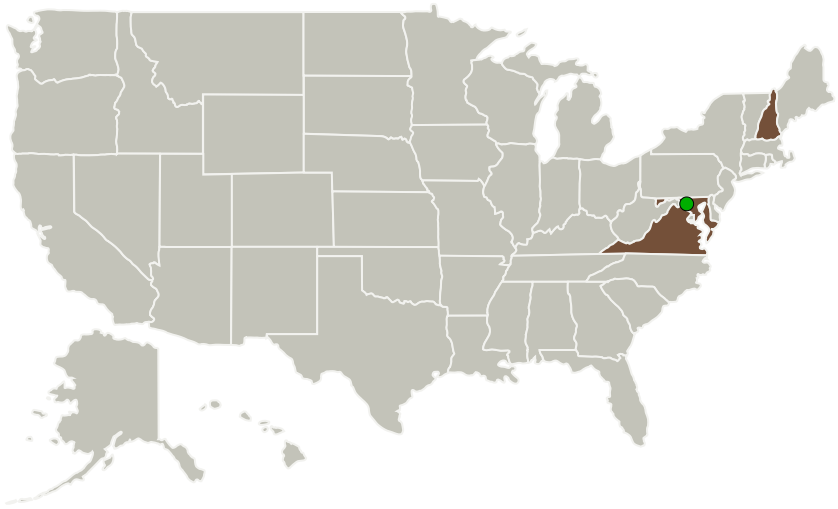
Ultra-Miniaturized Star Tracker for Small Satellite Attitude Control, Phase I

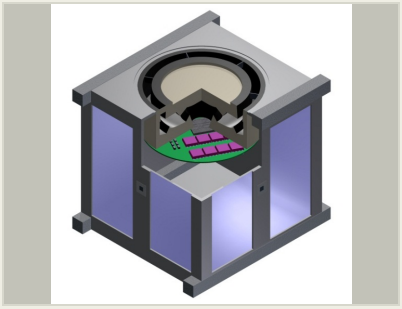
Completed Technology Project (2013 - 2014)

Project Introduction

Creare and Virginia Polytechnic Institute and State University propose to design, develop, test, and deliver an ultra compact star tracker specifically intended for small satellites such as the CubeSat platform. Our design is based on proprietary "folded optics" technology previously developed by our partner for use in military and commercial optical applications that require a compact footprint and high performance. The folded optics design is superior to conventional refractive optics in miniature star trackers because (1) the compact footprint is achieved without sacrificing accuracy; (2) the light-gathering aperture is much greater, leading to better sensitivity; (3) the aperture geometry makes the shielding baffles smaller; and (4) the imaging sensor can be shielded efficiently from cosmic radiation. During the Phase I project, we will demonstrate the feasibility of our innovation by finalizing the design, performing analysis to determine the optimal design parameters, and testing a benchtop prototype to verify the design models. In Phase II, we will fabricate the optimized design, test the prototype in the laboratory and in the field, and deliver the prototype to NASA.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Creare LLC	Lead Organization	Industry	Hanover, New Hampshire
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland
Virginia Polytechnic Institute and State University(VA Tech)	Supporting Organization	Academia	Blacksburg, Virginia

Primary U.S. Work Locations	
Maryland	New Hampshire
Virginia	

Project Transitions

May 2013: Project Start

May 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140487)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Creare LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Paul H Sorensen

Co-Investigator:

Paul Sorensen

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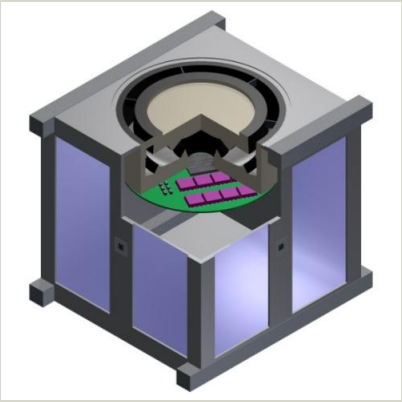
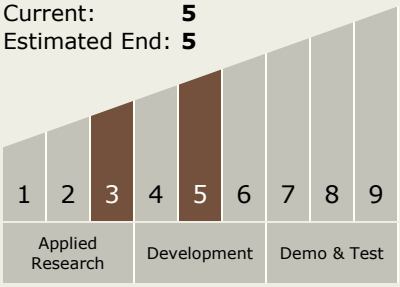
Images



Project Image
Ultra-Miniaturized Star Tracker for Small Satellite Attitude Control
(https://techport.nasa.gov/image/133516)

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.2 Navigation Technologies
    - TX17.2.3 Navigation Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System